CLAIMS

1. Method of rejection of noise and interference from a received combination signal by estimation of the desired signal having in addition to noise and interference been distorted by a communication channel through which the modulated transmitted desired signal has been passed, c h a r a c t e r i z e d by the following steps

a) receiving a signal as a combination of noise, interference and the distorted desired signal through one or more antennas,

b) separating the received signal into a real and an imaginary part,

c) modeling the noise and interference component as a filtered process,

d) forming an equation for the received signal as a function of the desired signal distorted by the communication channel and the noise and interference component by utilizing the signal structure obtained in steps b) and c),

e) selecting of values for the filter parameters in said equation,

f) estimating the desired signal by calculation from said equation by means of said filter parameters selected in the foregoing step.

2. Method of claim 1, ~~c h a r a c t e r i z e d in that in step d)~~, said distortion caused by the communication channel is taken into consideration by modeling the channel as a linear filter coefficient in said equation.

3. Method of claim 2, ~~c h a r a c t e r i z e d in that~~ said filter parameters and channel coefficient are calculated by means of a known training sequence from the equation formed in step d) by knowledge of the data sent by the signal in said training sequence and by knowledge of the statistical properties of the noise component,

whereafter the desired signal is estimated mathematically by means of an equalization method.

4. Method of claim 3, ~~c h a r a c t e r i z e d in that~~ the equalization method is carried out by means of a sequence estimator using a mathematical algorithm for the estimation.

5. Method of claim 3, ~~c h a r a c t e r i z e d in that~~ in the filter parameters and the channel coefficient mathematical algorithm, the number of the parameters is selected by an order estimation procedure.

6. Method of ~~any of~~ claims 3 ~~to 5~~, wherein ~~characterized in that~~ in the mathematical algorithm, the desired signal is estimated mathematically by using the maximum likelihood method for the equation giving the received signal, whereby the value for the received signal giving the least error can be obtained without being forced to calculate the received signal for different values of the desired signal.

7. Method of ~~any of~~ claims 3 ~~to 5~~, wherein ~~characterized in that~~ the received signal is recreated by means of the channel estimate and the filter parameters and different values for the desired signal,

the recreated value of the received signal is compared with the true value for the received signal to obtain error values for the received signal,

estimating the desired signal by selecting the one giving the least error for the received signal.

8. Method of ~~any of~~ claims 1 ~~to 7~~, wherein ~~characterized in that~~ the method is repeated for each received symbol sequence.

9. Method of ~~any of~~ claims 1 ~~to 8~~, wherein ~~characterized in that in step c)~~, the noise and interference in step c) is modeled as an AR filter process.

10. Method of ~~any of~~ claims 1 ~~to 8~~, wherein ~~characterized, in that~~ in step c) and d) the noise and interference and channel is modelled so that the received channel is described by an ARX model.

11. Method of claim 9, wherein ~~characterized in that~~ the number of filter parameters ~~worth~~ to be taken into consideration in the AR process are estimated adaptively by means of known algorithms.

12. Method of ~~any of~~ claims 1 ~~to 11~~, wherein ~~characterized in that~~ the received signal has been linearly modulated.

13. Method of ~~any of~~ claims 1 ~~to 11~~, wherein ~~characterized in that~~ the received signal has been non-linearly modulated, whereby after step a), the signal is de-rotated.

14. Method of ~~any of~~ claims 1 ~~-11~~, wherein ~~characterized in that~~ the received signal has been non-linearly, whereby after step a), the signal is approximated with a linearly modulated signal. by means of de-rotation.

15. Method of ~~any of~~ claims 5 ~~-14~~, wherein ~~characterized in that~~ an adaptive order selection method of the process is used.

16. Method of ~~any of~~ claims 5 ~~-14~~, wherein ~~characterized in that~~ a suboptimal method for estimation of the desired signal is used.

17. Method of ~~any of~~ claim 15, wherein ~~characterized in that~~ in said adaptive order selection method the adaptive order is estimated by using a threshold test on the residuals.

18. Method of claim 15, wherein ~~characterized in that~~ each estimated model of different orders is used to equalize a number of symbols and determine the corresponding metric and using said metric to select said model order.

19. Method of ~~any of~~ claims 17 ~~-18~~, wherein ~~characterized in that~~ the adaptive order selection method used is a recursive implementation of the identification algorithm.

20. Method of ~~any of~~ claims 1 ~~-19~~, wherein ~~characterized in that~~ prefiltering is used before the filter process, which is implemented in the equalization method.

21. Method of ~~any of~~ claims 1 ~~-20~~, wherein ~~characterized in that~~ oversampling is used to obtain more channels thereby giving larger potential for the system.

22. Method of ~~any of~~ claims 1 ~~-21~~, wherein ~~characterized in that~~ in linearly modulated systems, the information of the filter is taken into consideration in the demodulation process.

23. Method of ~~any of~~ claims 1 ~~-22~~, wherein ~~characterized in that~~ the performance of the receiver is improved by decision direction, whereby the decisions of the received symbols is used in a re-estimating of the same.

24. Apparatus for rejection of noise and interference from a received combination signal having functions for estimation of the desired signal which in addition to noise and interference has been distorted by a communication channel through which the modulated transmitted desired signal has been passed, c h a r a c t e r i z e d by

a) means for receiving a signal as a combination of noise, interference and the distorted desired signal through one or more antennas,

b) means for separating the received signal into a real and an imaginary part,

c) means for modeling the noise and interference component as a filtered process,

d) means for forming an equation for the received signal as a function of the desired signal distorted by the communication channel and the noise and interference component by utilizing the signal structure obtained in steps b) and c),

e) means for selecting of values for the filter parameters in said equation,

f) means for estimating the desired signal by calculation from said equation by means of said filter parameters.

25. Apparatus of claim 24, ~~c h a r a c t e r i z e d in that~~ wherein said distortion caused by the communication channel is taken into consideration in said equation by the means for forming the equation by modeling the channel as a linear filter coefficient.

26. Apparatus of claim 25, c h a r a c t e r i z e d in that said means for selecting of values for the filter parameters in said equation include means for calculating the filter parameters and channel coefficient by means of a known training sequence from the equation by knowledge of the data sent by the signal in said training sequence and by knowledge of the statistical properties of the noise component,

the means for estimating the desired signal from said equation by means of said filter parameters calculating the desired signal by means of a sequence estimator.

27. Apparatus of claim 26, ~~c h a r a c t e r i z e d in that~~ wherein the sequence estimator uses a mathematical algorithm for the estimation.

28. Apparatus of ~~any of~~ claims 24-~~27~~, ~~c h a r a c t e r i z e d in that~~ wherein the means for modeling the noise and interference uses an AR filter process.

29. Apparatus of claim 28, ~~characterized in that~~ wherein the the means for modeling the noise and interference using an AR filter process comprises means for estimating the number of filter parameters worth to be taken into consideration using known adaptive algorithms.

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